

JPRS 81458

5 August 1982

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 155

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BRIEFS

NUCLEAR NONPROLIFERATION TREATY--An agreement was signed between Bangladesh and International Atomic Energy Agency (IAEA) for the application of safeguards in connection with the Treaty on Non-proliferation of Nuclear weapons (NFI) in Vienna on June 11 last, an official handout said in Dacca on Saturday, reports BSS. The Chairman of the Bangladesh Atomic Energy Commission, Dr. Anwar Hossain, and the Director General of the International Atomic Energy (IAEA), Dr. Hans Blix, signed the agreement. The agreement was approved by the IAEA's Board of Governors on February 24 last and was negotiated with Bangladesh after she acceded to NPT on September 1979. At present 117 states are party to the Treaty. [Text] [Dacca THE BANGLADESH TIMES in English 20 Jun 82 p 1]

CSO: 5100/7115

DRAFT CONVENTION CIRCULATED AT UNITED NATIONS

New Delhi PATRIOT in English 24 Jun 82 p 3

[Text]

UNITED NATIONS, June 23 (UPI).

AN Indian draft convention against use or threat to use nuclear weapons circulated at the United Nations yesterday, voices alarm at "the threat to the very survival of mankind posed by the existence of nuclear weapons".

The draft, submitted last week to UN Secretary-General Javier Perez De Cuellar, is for consideration by the delegations at the ongoing UN Conference on Disarmament.

It commits states to undertaking they won't use or threaten to use nuclear weapons under any circumstances.

External Affairs Minister P V Narasimha Rao has observed that agreement on total ban on use of nuclear weapons is the most urgent step in efforts to root out the menace.

Mr Rao told the conference on 11 June that his delegation would table a draft convention on the subject for the members consideration.

Almost half of the member States have already addressed the conference, which began on 7 June.

Soviet Foreign Minister Andrei Gromyko brought with him pledge from President Leonid Brezhnev that Moscow won't be the first to use nuclear weapons.

But his plea for "reciprocal steps" by the other nuclear weapon States has drawn little response so far.

Western diplomats call it an "old hat". The Chinese say they had committed themselves to a "no first use" when they first tested a nuclear weapon in 1964.

CSO: 5100/7114

AEC CHAIRMAN SETHNA SPEAKS AT LAUSANNE MEETING

New Delhi PATRIOT in English 24 Jun 82 p 7

[Text]

LAUSANNE (Switzerland), June 23 (PTI)
NUCLEAR energy will constitute a major plank of power generation in India by the turn of the century, Atomic Energy Commission Chairman Homi N Sethna said here today.

Addressing VIII Foratom Congress, Dr Sethna said the Indian nuclear power programme presented a unique example of attaining national capability in a high technology developing country.

Stressing the need for self-reliance, he said, India had a cadre of specially trained scientists and engineers who had acquired the expertise demanded by nuclear industry.

Tracing the growth of India's nuclear sector, Dr Sethna said when it was decided to build Apsara, the first reactor of the swimming pool type, "we had hardly any expertise of direct relevance in reactor design or construction."

India was then importing even simple machinery. The task was assigned to a young group of qualified engineers, with some industrial training, and scientists engaged in cosmic ray research.

The success of this heralded further ventures giving impetus to planning and implementing subsequent phases of the country's atomic energy programme.

Apsara was followed by Cirus, the 40 mw thermal research reactor, in 1956 with Canadian co-

operation. "We were able to establish our capability to produce even for the first charge one half of the fuel elements meeting stringent specifications," he said.

The US-aided Tarapur power station and the joint Indo-Canadian venture in Rajasthan provided valuable experience, Dr Sethna said.

As a result, for the second unit of the Rajasthan power station, most of the equipment was manufactured in India. A higher degree of self-reliance was achieved in setting up the nuclear power plant in Madras.

For the fourth nuclear power station at Narora, new designs were worked out. When work on the fifth nuclear station was taken up at Kakrapar in Gujarat, the country was more or less self-reliant in nuclear technology, he said.

In achieving "rapid progress in a developing country in nuclear power generation involving highly complex and sophisticated technological inputs, self reliance in knowhow and manpower is a must," he concluded.

CSO: 5100/7114

FOREIGN MINISTER DEFENDS COUNTRY'S NUCLEAR DEVELOPMENT PROGRAM

Karachi JANG in Urdu, 31 May 82, p 3

[Text] The foreign minister Sahabzada Mohammed Yaqub Khan said that Pakistan has always been against the proliferation of nuclear weapons and is engaged in lessening the world tension and has informed the International Atomic Energy [IAEA] about the peaceful nature of its nuclear program. He said that Pakistan will emphasize the need of securities for non-nuclear countries. In this regard he referred to Pakistan's efforts in declaring South Asia and Indian Ocean as a nuclear-free zone. At the Islamabad airport, while departing for non-aligned countries' congress in Havana, Mr Yaqub Khan extolled the virtues of nonalignment and said that Pakistan adhered to those virtues.

Pakistan has been pursuing the policy regarding the nuclear weapons which the foreign minister spoke about for many years. Ever since Pakistan has undertaken nuclear development it has been her stand that nuclear energy should be developed as a fuel resource, because Pakistan does not have alternative resources for fuel. It can satisfy increasing demand for fuel only through nuclear energy. The biggest proof of this policy, all accusations notwithstanding, is that Pakistan has not undertaken even a small nuclear explosion. There have been a lot of conspiracies against Pakistan's nuclear program in the past. From Washington to London, in all forms of media, there have been all kinds of accusations--including the stealing of nuclear instruments from international organizations. Zionist and Indian lobbies, to frighten the world, branded the so-called Pakistan's atom bomb as an "Islamic bomb" and connected it with Libyan economic resources.

In this regard the most deplorable attitude has been adopted by India which, not only has had one explosion but is engaged in preparations for another explosion and is not willing to let its nuclear installations be inspected by the IAEA. It also opposes the declaration of Indian Ocean and South Asia as nuclear-free zone and in addition, accuses Pakistan of making an "Islamic" nuclear bomb. India has been helped most in this regard by the attitude of the United States and France, since the former President Carter, without making a due check, had put an embargo on U.S. aid to Pakistan and, at Carter's bidding, the former French President Giscard d'Estaing refused to sell Pakistan the nuclear reprocessing plant. Pakistan faced these conditions

bravely; the present American government was finally convinced of its sincerity and announced the restoration of U.S. aid.

But recently activity in the Senate Foreign Relations Committee has made it clear that Indian and Zionist lobby is still fully active against Pakistan. The biggest propaganda tool it has is that Pakistan is about to manufacture a nuclear bomb. Although this matter is for the time being resolved in the foreign relations committee, it is yet to be discussed in both the Senate and the House of Representatives. Therefore Pakistan should brace itself to face its enemies in both chambers. The foreign minister, Mr Yaqub Khan has said something very important in this regard, that Pakistan has informed the IAEA of the peaceful nature of its nuclear program. He also stressed on the security for non-nuclear nations and declaration of South Asia and the Indian Ocean as nuclear-free zone. In our opinion, Pakistan should demand through nonaligned nations, the UN and the Organization of Islamic Conference at various levels that the countries putting obstacles in the way of declaring South Asia and Indian Ocean as a nuclear-free zone should be condemned.

Pakistan should express its stand vociferously. This matter should be stated before the visiting dignitaries so that it may be included in the joint communiques and may be helpful in mobilizing world opinion in Pakistan's favor.

9859

CSO: 5100/5761

BRAZIL

MINISTRY OFFICIAL DENIES KNOWLEDGE OF BECHTEL OFFER

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Jul 82 p 34

[Text] Dario Gomes, adviser to the Ministry of Mines and Energy on Nuclear Affairs, said yesterday that he is completely unaware that Bechtel, a company headed by George Shultz until his nomination to the U.S. Department of State, had proposed to the Brazilian Government the construction of a uranium enrichment plant in the Amazon jungle in 1975.

Gomes declared that the report from the United States, published yesterday by the Carioca newspaper, "is very odd because up to now the Brazilian Government has not discovered uranium in Amazonas and in 1975 it did not yet have knowledge of the uranium reserve of Itataia in Ceara."

He also considered the report odd because in 1975 the U.S. Government was the greatest opponent of the Brazilian nuclear program. He also recalls that at that time President Ernesto Geisel denounced the Brazil-U.S. military agreement because of the pressures President Jimmy Carter put on Brazil to freeze the agreement signed with Germany which stipulated the construction of eight nuclear powerplants in Brazil and the transfer of German fuel technology.

Gomes did not accept the possibility that the Bechtel Corporation may have discovered the existence of uranium mines in the Amazon jungle. He said, however, that he does not mean to say that there is no uranium in that region: "I only assert that the Brazilian Government has not yet found that mineral in that region," he said, "and that NUCLEBRAS [Brazilian Nuclear Corporation] is involved in no activity there. It may be that the mineral exists, even because it is mixed in the soil with other minerals."

The largest deposits of gold, such as Tapajos and Serra Pelada, emeralds, rare metals, cassiterite and diamonds are concentrated in the Amazon Region.

8908

CSO: 5100/2210

ARGENTINE, NATIONAL NUCLEAR BOMB POSSIBILITIES DISCUSSED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 Jul 82 p 2

[Article by Jose Goldemberg: "Brazil, Argentina and Atomic Bombs"]

[Text] It was a surprise for many that the Argentine military did not threaten to resort to atomic weapons as a means of pressure against the British during the Malvinas War. It is very true that neither the Malvina Islands nor the British fleet were suitable targets for the employment of nuclear weapons but Argentine domestic moral would have been greatly strengthened by a show of force through the explosion of a nuclear device in a remote region of Patagonia.

Something similar was done by the Indians in 1974; the detonation of their first atomic bomb, which they still euphemistically call an "explosion for peaceful purposes."

In the Argentine case, this demonstration of force and advanced technology would not only serve for domestic purposes but also for acquiring greater respect abroad and, therefore, better negotiating conditions with the British.

The fact that it did not happen shows that the Argentines are not yet ready to make nuclear weapons, or that the situation was not considered extreme enough for going that far by their leaders.

From a technical point of view, the Argentine option in the nuclear area is similar to that of India, that is, the use of natural uranium, it being therefore only a question of time for its capabilities to produce nuclear weapons regardless of outside pressure. This choice was made in the decade of the '50s and the Argentine nuclear program was always oriented toward using and developing local technology. Even during the worst periods of political repression in the universities, the technical personnel of the Argentine National Atomic Energy Commission (CNEA) were preserved (minus some exceptions), and Admiral Castro Madero, president of the CNEA, was very effective in protecting his personnel.

Since the natural uranium line is free of the oversight of the IAEA (because it did not sign the Nuclear Nonproliferation Treaty), Argentina may produce plutonium, purify it and make low-yield atomic bombs such as those of Hiroshima and Nagasaki, but even so, very powerful. It is known that Argentina has uranium reprocessing pilot plants for the production of plutonium, which should be sufficient for some bombs. Five kilos of plutonium are enough to make one of them.

it is possible that the construction of the bombs may have presented some problems but there is enough literature available in that respect. With the reasonable technological base that Argentina has, it should be possible to repeat what the Indians did.

It is possible that the Malvinas War took place too early, before the Argentine technicians finished their work, but with the defeat they will probably be encouraged to complete it as a weapon to be used to assuage the wounded pride of the nation and to improve its negotiating position.

This appears to be the most probable hypothesis; the other is that the bombs do exist and a political decision was made not to use them. This is what is presently happening with Israel, which certainly--in our opinion--has bombs made with the natural uranium reactor of Dimona, which is free of international oversight. The Israelis would probably only use atomic bombs to prevent the destruction of the state of Israel, which is not about to happen soon. Many believe that Israel would do it against Aeswan or Cairo in 1973 if they did not manage to halt the military advance of the Egyptians.

Whatever the situation may be in Argentina with respect to nuclear weapons (temporary technical difficulties or political decisions), it places Brazil in an uncomfortable position.

The technological choice by Brazil (made during the administration of Costa e Silva in 1969 and intensified even more by the Geisel government in 1975) is that of using enriched uranium, which the country does not produce and will not be able to produce within the foreseeable future. Even if the machines that are being developed in Germany for the employment of the "centrifugal jet" method were to work, they only enrich uranium to a degree that does not allow the construction of nuclear bombs. Moreover, Brazil, despite the fact that like Argentina it did not sign the nonproliferation treaty, signed so many inspection agreements with the international agency that in practice the freedom of the country in this area is purely rhetorical.

Unless it is by means of a "parallel nuclear program," of which nothing is known, it is not possible for Brazil to compete with Argentina in this area. This is the high price to which the line of technological dependence in the nuclear area of the governments of Costa e Silva and Geisel led us. The lack of confidence in the national capability and the obtainment of sealed (and doubtful) technological packages in Germany led us in 1982 to a worse dependence than the one we had 15 years ago when the embryo of an independent nuclear program with the support and participation of our scientists, was first seen in the country.

If Argentine were to "surprise" us with the explosion of a "peaceful" nuclear bomb in the near future, the weakness of the Brazilian strategic position would be exposed with all clarity.

Technological independence, always advocated by Brazilian scientists and industrial groups, also has within it the seeds of military independence; both were lost in the last 15 years.

BRAZIL

URANIUM REPROCESSING PLANT CONSTRUCTION TO BEGIN IN 1983

Rio de Janeiro O GLOBO in Portuguese 2 Jul 82 p 17

[Text] NUCLEBRAS [Brazilian Nuclear Corporation] President Paulo Nogueira Batista announced yesterday at the War College [ESG] that construction of the uranium reprocessing plant--the most important phase in the cycle of that fuel which allows the obtention of plutonium--will begin next year and that it will go into operation in 1988.

Shortly afterward, in an interview, he reported that several studies exist on the location of the plant, although he could not reveal the sites researched. Faced with the insistence of reporters, he admitted the plant will be near the ocean.

Basic Project

Nogueira Batista said the country already has the complete basic project for the reprocessing plant and the execution of the detailed engineering is fully underway.

"We shall acquire competence, not only for managing the implantation of the undertaking but also for planning similar installations of an industrial scope in the future," he added.

To the president of NUCLEBRAS, the delay of 4 years in the construction of the Angra 1 and Angra 2 powerplants concluded by becoming a favorable factor. It was possible to make an adjustment in the Nuclear Program and to establish a more suitable cadence in the installations of the plans and other undertakings.

The participation of NUCLEP [NUCLEBRAS Heavy Equipment, Inc.] and of the Fuel Element Factory may be substantially increased, transferring to Brazil services heretofore stipulated to be performed in Germany. The national share in the fabrication of heavy equipment for the Steam Generation Nuclear System (SNGP) for the two powerplants to be built in Iguape, Sao Paulo, was also increased from 70 percent to 100 percent. It also became possible to renegotiate the already existing contract with the KWU on the supply of initial fuel loads for Angra 2 and Angra 3, loads which now become almost entirely the responsibility of the Fuel Element Factory.

"In similar fashion, in the area of uranium enrichment, delays in the nuclear powerplant program provided the opportunity for a revision of the original plan for the construction of a 200,000 Separative Work Units per year plant initially scheduled for operation in 1983. The results obtained in separation elements technology allowed, because of the extension of the timetable, the incorporation of considerable improvements in the process."

The president of NUCLEBRAS pointed out that Brazil will have the capability of enriching uranium industrially as of 1986 at the level of 60,000 kilos, capacity which will be increased as of 1988 to nearly 300,000 kilos. This capacity will take care of national demand up to 1995, when the new isotopic separation plant will go into operation.

Jet Nozzle Process

On the jet nozzle process already adopted for the plants of the Nuclear Program, Paulo Nogueira Batista said that it can be competitive due to the improvements introduced. However, if it were to be uncompetitive, the government is ready to pay the expense, because what is important is the assimilation of technology. He explained that the jet nozzle process is the intermediate process between gaseous diffusion and centrifuge technology.

Nogueira Batista said the Nuclear Program is now progressing at a normal cadence with the goal of a powerplant every 2 years instead of the installation of one unit per year.

8908

CSO: 5100/2210

SBPC SCORES CTA NUCLEAR RESEARCH FOR MILITARY PURPOSES; REACTION

Scientists Condemn Bomb-Making

Sao Paulo FOLHA DE SAO PAULO in Portuguese 9 Jul 82 p 26

[Text] "The scientific community must not go along with any attempt to develop devices, in any type of institution, whose ultimate purpose will be the destruction of human lives," declared the geneticist Crodowaldo Pavan yesterday afternoon in Campinas; he is president of the SBPC (Brazilian Society for the Advancement of Science) and he was commenting on a story published in FOLHA, reporting the existence, in Sao Jose dos Campos, of a laboratory which is directed by military personnel and which is conducting nuclear experiments that may be the embryo of the Brazilian atomic bomb.

Pavan said that it is difficult immediately to adopt a position because there is no certainty whether the atomic bomb would be made; but he maintained that the government must clarify the issue. According to him, the creation of institutes promoting higher studies--such as the Institute of Advanced Studies at the Aerospace Technical Center--basically is an idea that deserves the support of scientists, "especially if they are created or promoted not only in Sao Jose dos Campos but also at the universities."

"But," he pointed out, "if this effort is headed toward military uses, then it has and will have our total disapproval since this is the generalized trend of thinking in the university community."

Other scientists who were questioned expressed their concern with the use of scholarships for research and stated their opposition to the development of nuclear research in military installations. They emphasized that the participation of university researchers in this effort is a negative thing and they were particularly irritated over the fact that scholarships intended for research on armaments show up in the budgets as a part of the total amount earmarked by the administration for the development of science and technology.

"If you were to decide to grant a scholarship for research for which a physicist from a university and a military man from a center such as the CTA [Aerospace Technology Center] or the Military Engineering Institute were to compete, to whom would you award the scholarship in the country's current situation?" asked leaders of the Brazilian Physics Society with a note of irony.

Physicist Enio Candotti, a professor at the Physics Institute of the Federal University of Rio de Janeiro and editor of the magazine CIENCIA HOJE, put out by the SBPC, did not spare his criticism of nuclear research at the CTA, especially because this research is being done with the support of scientists from traditional academic institutions.

I am personally opposed to the development of technology for the manufacture of the bomb but I suppose I might even accept this sort of thing if it were to be decided by the nation in a democratic fashion, through the proper channels, such as parliament, subject to social control. But so long as the military will not return to the barracks, one cannot accept any collaboration between the scientific community and institutions that develop programs that can have military applications," he said.

Physicist Rogerio Cerqueira Leite will coordinate the symposium on the allocation funds for research aimed at military applications this coming Monday; he explained that "The point of agreement among opinions held by the scientific community as of this moment is represented by concern over the use of funds which should be earmarked for research at academic centers but which instead are supposed to go to military laboratories."

Cerqueira Leite agreed that, in the current stage, pursuing manufacture through plutonium (which can be obtained from uranium used in commercial, small-size or experimental reactors), Brazil would be in a position to develop nuclear weapons in 2, 3, or at most 5 years. Using uranium (which requires enrichment) however, the cost of developing a military nuclear program would be higher and would at least take twice as long.

He did not wish to say anything about the positions that might be taken during the debate among scientists next Monday but admitted that proposals from the pacifist group might be possible.

"I believe that there is unanimous rejection of the idea of awarding scholarships from the National Scientific and Technological Development Fund for military research," he said.

In conclusion, Cerqueira Leite argued that the cooperation of the scientific community is indispensable at this time so that the military laboratories may develop nuclear arms. "It is not possible for this development to be accomplished without the aid of civilian scientists, at least for now."



Physicists Examine Commission Report

The board of directors and the council of the SBF (Brazilian Physics Society) will today examine the documentation collected throughout the year by the commission of three specialists appointed at the 33rd annual meeting of the SBPC, held in Salvador last year; it will be their job to evaluate the situation regarding funds allocated for research with military purposes in mind. The commission is made up of professors Jose Antonio de Freitas Pacheco, of the National Observatory (a specialist in aerospace science), Sergio Machado Rezende, of the Federal University of Pernambuco (a specialist in electronics and data processing), and Solange May de Barros, of the Federal University of Rio de Janeiro (a specialist in electronic accelerators).

The organization's leaders will decide whether they will make the document official and disclose it; this is the document whose general content is to be released to the public Monday afternoon during the symposium on fund allocations for research aimed at military purposes; this meeting will be attended by the commission members under the coordination of the physicist Rogerio Cerqueira Leite.

The commission was established as the result of a proposal signed during the SBF meeting by professors Luis Pinguelli Rosa, currently president of ANDES (National Association of Higher Education Lecturers), and Moises Nussenweig, currently president of the SBF; both of them are worried over the growing volume of scholarships allocated for military research.

Concerning the survey conducted by the three specialists, it was learned that it is not confined to an examination of action at the CTA but covers all military scientific-research laboratories.

The story published by FOLHA concerning the installation, about a year ago, of the current IEA (Institute of Advanced Studies), which has been integrated into the CTA, was amply confirmed by all scientists contacted yesterday and, by some strange coincidence, one of the symposiums held on the first day of

the scientific meeting at Campinas, on "Scientific Instruments and Accelerators," coordinated by Professor John D. Rogers, of the State University of Campinas, was attended by one of the officials responsible for the project being developed at the CTA, Professor Trentino Polga, a former director collaborator of the physicist Oscar Sala in building the Van Der Graff heavy-ion accelerator at the Physics Institute of USP (University of Sao Paulo). The title of the study contributed by Professor Polga at the symposium was "The Project for Advanced Study Laboratories of the CTA for a Linear Electron Accelerator"; this equipment is necessary to calculate the critical mass and to determine the physics of fission materials (electron shock section which is of interest in the production of nuclear weapons).

According to physicist Enio Candotti, "Until such time as scientists on the level and with the competence of Professor Polga started working at the IEA, there was no reason for concern; technicians of military origin certainly would never manage to develop the bomb. But with the team which is at Sao Jose dos Campos now, there is reason for worry. He (Polga) knows what to do and can assemble an efficient team."

According to the report from the scientists who witnessed the presentation by Professor Polga (the symposium was also attended by professors Roberto Logo and the former president of the SBPC, Oscar Sala, both of whom presented reports), the scientist admitted that the team now at work at the IEA "has no knowledge as to where the scholarships used in research come from."

"We only ask them (the military) and they either give us or do not give us the scholarship," said the scientist when questioned by his colleagues.

Danger of Fragmentation

Placing research of a strategic nature, such as nuclear research, within closed facilities, such as military research laboratories, where access to information is classified, is something which the coordinator of the post-graduate sector of the Physics Institute of Unicamp [University of Campinas], Professor Jose Carlos Valadao de Matos, is not desirable, to say the very least.

"Working in these laboratories, you can become involved in undesirable things, even without knowing it, as happened in the well-known Manhattan Project which developed the first American atomic bombs that were dropped on Hiroshima and Nagasaki. It is perfectly possible for the technological development of a device to be so broken up and compartmentalized that the researcher will not know to what use his work is going to be put. It is only necessary for somebody with the proper competence to assemble the pieces and, for example, to come up with the bomb, without those involved getting the big picture," he added.

Valadao de Matos recalled that there is no justification for the tremendous flow of capital and funds for equipment supplied to institutions, such as the IEA of the CTA for technological research, "even if this is research for peaceful purposes since the scientific community at this time is suffering from considerable budget cuts."

No Comments from Nuclear Power Establishments

"I am not a military man," was the response of NUCLEBRAS [Brazilian Nuclear Corporation] president Paulo Nogueira Batista as he denied yesterday in Rio that he had any knowledge of nuclear research conducted at the CTA at Sao Jose dos Campos, which is connected to the Ministry of Aeronautics whose objectives were viewed with suspicion at the annual meeting of the SBPC held in Campinas.

"NUCLEBRAS is not participating in CTA research," said Nogueira Batista, "since it is only responsible for the execution of the nuclear program based on the agreement with West Germany which calls for the installation of plants and the complete fuel cycle in Brazil."

Nuclear Energy Commission

Hervasio de Carvalho, chairman of the CNEN (National Nuclear Energy Commission) likewise in Rio refused to talk about the matter, saying only that the agency has an agreement with university research institutes concerning the training of technical personnel. As for the Data Cyber 170/750 computer, installed at the CTA, which will have terminals at the CNEN for the exchange of information, Hervasio de Carvalho confined himself to saying that the agency does not need other computers since it already has its own.

The scientists believe that it is the goal of CTA to build fast [breeder] reactors which run on plutonium and which can produce fuel when they operate. In May of last year an agreement was signed in Italy for the development of fast breeders in Brazil as part of the continuation of the cooperation accord signed in 1971; this agreement is intended, for a period of 3 years, to provide funds on the order of \$3 million per year.

This program was placed under the responsibility of CNEN and will be developed on the basis of the initial experience of the Nuclear Engineering Institute connected with it. Italy is already participating in the French program, which is more advanced, to the extent of 40 percent; a 1,200-Mw nuclear power plant--the Super Phenix--is already under construction in France.

The goal, by the end of those 3 years, is the training of personnel in Italy and in Brazil in sodium technology, in safety criteria, and reactor physics, theory, and experimentation, plus the assembly of the infrastructure, installations, and circuits for experiments in the field of sodium technology and the physics of the core of fast breeders. More detailed guidelines will be drawn up for the continuation of the program throughout this entire period of time.

Criticisms

The possibility that Brazil might make the atomic bomb on the basis of work being done by the IEA at the CTA was considered yesterday in Brasilia by Deputy Freitas Diniz, of the PT [Labor Party] as "serious primarily because of the secrecy surrounding it."

"By virtue of its implications, a program of this kind and size should be started only after a broad nationwide debate, including in Congress," the PT member of parliament emphasized; he then added that "Anybody who has plutonium with the purity and in the quantity required for laboratory work to promote the development of the technology that will permit the construction of fast breeders obviously has fissile material in sufficient quantity to explode dozens of Hiroshima-type atomic bombs."

Freitas Diniz--who was one of the few members of parliament to participate in the debates on the Brazilian-German nuclear agreement--recalled that NUCLEBRAS is in a position by virtue of this agreement to produce plutonium in the near future but, because of the system of safeguards, it will not be able to use it for military purposes.

Minister Denies Atomic Bomb Effort

Rio de Janeiro JORNAL DO BRASIL in Portuguese 13 Jul 82 p 17

[Text] Navy Minister Maximiano da Fonseca said yesterday in Rio that Brazil is not thinking of using money for the purpose of making atomic bombs and denied the existence of an arms race in the country. As for the reequipping of the Navy, the minister commented that this undertaking is moving with a tailwind, "a rather slight wind, but it is moving, in keeping with the country's possibilities since the country is facing many difficulties now."

In Brasilia, Gen Alacyr Frederico Werner, the chief of the EMFA [Armed Forces General Staff] with the rank of minister said that "Brazilian policy is aimed at the utilization of nuclear energy only for peaceful purposes." This was the only comment he made on this matter.

Difficulties

Admiral Maximiano in the morning attended the muster of the second group of officers of the Women's Reserve Auxiliary Corps. After the ceremony, he gave an interview during which he talked not only about the question of nuclear weapons but also about the November elections.

At first he said that he was not familiar with the charges made during the meeting of the SBPC concerning the diversion of scholarships for arms research.

"We are having tremendous trouble getting money for weapons research. The Navy is not getting any money other than what is allocated for armaments."

The question as to the existence of an arms race in Brazil produced an attitude of surprise in the navy minister.

"An arms race, here? Do you think that exporting is an arms race? If a country needs foreign exchange and jobs, would you say that you have an arms race when you employ 250 people at a factory which was opened last week for export purposes. Anybody who wants to buy can buy; anybody who does not want to buy does not have to buy."

The minister talked about the Navy's budget and the development that is being pursued with it.

"Does that mean that the Navy's reequipment is moving with a tailwind?"

"It is moving, with a slight wind, but it is moving. It will not stop. It goes along with the possibilities of the country which is having many problems and difficulties but it will continue and it will not stop."

"Will the Navy invest in atomic arms?"

"Of course not. Brazil is not thinking of spending money on atomic weapons. Missiles, yes. If we had money, we would buy more missiles. We do have missiles, including the famous Exocet, but we need more."

The minister commented as follows on the election campaign and the calm climate: "Until a short time ago, newsmen were asking whether there would be any elections. They have stopped asking that question because they are sure that we are going to have elections. I am sure that the calm climate will continue. Only if somebody wants to create trouble for instance by preaching revolution as in the case of an individual whom I do not even want to talk about [faded photostat]. If there is agitation, it will come from those who want to make trouble for some other reason."

The minister also added that "If there is going to be an election, somebody is bound to win and somebody is bound to lose and some people are poor losers."

At the SBPC

"There is no evidence that nuclear devices are being manufactured in Brazil," said physicist Sergio Machado Rezende, of the Federal University of Pernambuco, yesterday in Sao Paulo; he is one of the persons charged by SPBC with analyzing the allocation of funds for research for military purposes.

In attending the symposium held to discuss this matter, Professor Machado Rezende announced that, although this figure cannot be confirmed officially, it is calculated that 500 billion cruzeiros are being spent on this type of research in Brazil.

Foreign Office Denies Military Objective

Brasilia--Foreign Relations Ministry spokesman Bernardo Pericás [faded photostat] said yesterday that Itamarati [Foreign Office] "does not know of any nuclear program for military purposes which is being developed in Brazil." According to him, there is a Brazilian government policy decision not to produce military devices employing nuclear energy.

The statement was made in response to charges by physicists at the University of Campinas yesterday during the symposium on fund allocations for military research promoted by the SBF. The symposium is a part of the official program for the 34th annual meeting of the SBPC.

Technicians at the GLB Watahin Physics Institute at Unicamp revealed that the IEA of the GTA in Sao Jose dos Campos will spend about 400 billion cruzeiros over a period of about 8 years on the development of research on nuclear energy for military purposes.

CNO Says What Brazil Can Do

Rio de Janeiro JORNAL DO BRASIL in Portuguese 10 Jul 82 p 15

[Article by Romualdo Barros: "Admiral Says What Brazil Can Do"]

[Text] Brazil is in a position to make the atomic bomb but that is not the country's desire. In the third millenium, issues will not be decided by atomic bombs. Gases, for example, have already caused such destruction on both sides that they were never used again. This is what we call the balance of terror. We must develop defensive weapons. And defensive weapons for the third millenium must be laser ray, microparticles and others. But not the atomic bomb."

This statement was made by the CNO, Sqdn Adm Jose Gerardo Theophilo Albano de Aratanha who concentrated on physics in his university education. He gave a press interview after presiding over the opening of the Admiral Jurandyr da Costa Muller de Campos ammunition factory of the Navy. Operated by a private outfit called FI Industria e Comercio Ltda, the factory is already producing under contract for ENGESA [Specialized Engineers, Inc] and it is to get \$7 million (1.2 billion cruzeiros) for its participation in the export of tanks.

Private Control

FI Industria e Comercio Ltda is managed by engineer Alvaro Buarque Goulart who took courses at the Military Engineering Institute and in the Navy; he was promoted to the rank of Lieutenant Commander and was transferred to the reserve in 1973. He believes that the business experience he is getting in the ministry's agency can be useful if a decision were to be made to turn the Rio de Janeiro Naval Arsenal over to private control.

"As I see it, the Arsenal must be placed under private control. Of course, this must be part of a long-term program because of the complexity of the undertaking," said engineer Goulart. As for FI, he added that it is using land and equipment belonging to the Navy and this is why the investment--500 million cruzeiros--is relatively small. Initially it employed 270 workers, both men and women, mostly from among Navy personnel; by the end of the year, it should have 600 workers.

Located on Brasil Avenue, at kilometer marker 45, in Camp Grande, FI Industria e Comercio Ltda is using steel, aluminum, copper, and tin as raw materials to make the casings (the metal part) for cannon shells. By the end of the year, an annex is to be built there to fill those casings (the powder will come from the Army's factory in Piquete) and to deliver the ammunition ready for use. In addition to this, it will use machinery already installed to make parts for guns.

The idea of turning the Navy Arsenal over to private control is now being examined, Admiral Aratanha admitted. He added however that the Arsenal is operating as a shipbuilding facility and as a repair center for Navy warships. This latter function places it among the institutions which serve national security and that rules out the possibility of private control.

As for the cut in the imports of the Navy Ministry by \$45 million, ordered by the president of the republic for all government agencies, "This is cause for concern to the extent that it can delay the corvette construction program to replace the destroyers which have been in operation for 36 years," he said.

Admiral Aratanha presided over the ceremony, representing Navy Minister Maximiano da Silva Fonseca. VAdm Mario Jorge da Fonseca Hermes, who is in charge of the Armament and Communications Directorate of the Navy, read his order of the day, emphasizing that the honoree, Admiral Jurandyr da Costa Muller de Campos, preached extensive cooperation between the civilian and military industrial sectors for the national development of technology.

The widow of Admiral Muller de Campos, Mrs Celia Lima Muller de Campos, unveiled the commemorative plaque at the ammunition factory.

During the various interviews which he granted newsmen present at the opening, Admiral Aratanha emphasized the need for "Brazilians being prepared to defend the nation." He recalled however that "Humanity must learn to live in peace."

Navy Minister's Comments

"It is an exaggeration," said Navy Minister Adm Maximiano da Fonseca yesterday after denying that there is any initiative in his ministry aimed at making Brazilian atomic bombs. He added that the Navy is pursuing research in the area of nuclear energy "but for the purpose of using it in ship propulsion which has priority."

Adm Maximiano da Fonseca at the Navy Arsenal presided over the ceremony for the keel-laying of the hospital ship "Oswaldo Cruz" and "Carlos Chagas" which will be delivered within 24 months. The two vessels will have four wards, an operating room, dental offices, outpatient facilities, laboratories, and x-ray equipment and will be used to assist the people living along the rivers in Amazonia.

In the quick interview which he gave after the ceremony, the navy minister admitted that the reequipment plan for the Navy "is coming along slowly and not with all the funds which we need." But he did emphasize that the main objective is being attained "since the main concern of the reequipment plan is to make sure that Brazil will not have to depend on anybody ever."

Adm Maximiano da Fonseca mentioned as example the ammunition factory, opened yesterday morning in Campo Grande. "With this factory, we will no longer have to stockpile ammunition. In case of an emergency, our need can be taken care of in 24 hours," he explained.

Military Research Denied

Rio de Janeiro JORNAL DO BRASIL in Portuguese 11 Jul 82 p 34

Sao Paulo--Aeronautics Minister Delio Jardim de Matos yesterday said in Pirassununga (in the interior of Sao Paulo) that the administration is not studying nuclear projects for military purposes. He did not wish to talk any further about the matter and asked that the director of the Aerospace Technical Center at Sao Jose dos Campos, MGen Lauro Nei Menezes, who was by his side, provide further explanation. The latter officer noted that research in this field was not aimed at "immediate application" and that "there is nothing secret about it."

"The entire Brazilian scientific community is involved in our project so that there has been a little bit of sensationalism, such as in the SBPC itself, whose 34th meeting was held in Campinas," he told newsmen. "The scientists talked about these things, they said everything and therefore they knew everything. There was nothing secret about this," said the CTA director.

5058

CSO: 5100/2219

ARLIT, AKOUTA URANIUM DEPOSITS, PRODUCTION DESCRIBED

Niamey SAHEL HEBDO in French Special Issue 15 Apr 82 pp 37-39

[Article by Massalaki Abdoulaye Moussa: "The Air Mines: Arlit-Akouta or the Uranium Adventure"]

[Text] Arlit and Akouta, located on the southern edge of the Hoggar, some 250 km northwest of Agadez--whoever hasn't discovered these cities, synonymous with uranium, doesn't really know Niger or suspect its variety, the harshness of the climate and the courage of its people. It should be done, however, because it's in the midst of sparse bushes and a few tufts of grass, testimony of a dry desert climate, that the thousands of Nigerien executives, workers and employees of the uranium mines that provide nearly 80 percent of Niger's export revenue live and work. For the lazy, it's a matter of seeing Arlit and Akouta and "dying of shame."

The Birth of the Corporations

The recent history of this region began in 1956 with the explorations made in Niger by the Atomic Energy Commission (CEA). It was these geological explorations that led to the discovery, between 1960 and 1966, of several exploitable uranium deposits.

Since then, the pace has quickened. On 1 February 1968, the Air Region Mining Company (SOMAIR) was created, a Nigerien corporation whose capital, originally 2.7 billion [CFA francs], would later reach 4 billion.

SOMAIR is working a portion of the Arlit uranium deposit leased by the CEA, a deposit whose concession will from now on be held by the General Nuclear Materials Company. The creation of the Akouta Mining Company (COMINAK) occurred on 12 June 1974, with the purpose of working the Akouta uranium deposit leased to it by COGEMA. This deposit is located 10 km southwest of the city of Arlit.

SOMAIR's Operations and Production

The Arlit uranium deposit is located in sedimentary formations constituting a gigantic foliation in which sandstone and clay overlay one another in layers

of varying thicknesses. The area leased to SOMAIR is divided into three zones: Arlette, Arlege and Artois.

The Arlit deposit is an open-pit operation, which necessitates strip mining. In certain worked portions, the barrier material covering the ore-bearing formations is 35 to 80 meters thick. For just the Arlette zone, a little more than 3 million tons of scrap had to be stripped off before the ore-bearing zone was reached at the end of 1970.

The ore extracted from the quarry is first crushed and dry-heat pulverized. In this powdered form, it undergoes sulfuric acid treatment for 2 1/2 to 3 hours. After layer separation and drying, liquid uranyl sulfate is obtained. Purified by an organic solvent, the uranium, in the form of uranyl carbonate, is extracted by using sodium carbonate.

By adding caustic soda, the decomplexing of this latter product is carried out, along with the precipitation of uranium in the form of sodium uranate. After being dried and weighed, the sodium uranate is sampled and then stored. Sale of the product to the shareholders--ONAREM [National Office of Mineral Resources] (33 percent), COGEMA (26.96 percent), French Company of Mokta, Minatonne, etc.--can then begin.

In 1971, specifically on 1 January, the first output of marketable product, at about 70 percent quality, was obtained. That year, 410 tons were produced. Production steadily increased: 1,305 tons in 1975, 1,460 tons in 1976, 1,710 tons in 1978, 1,780 tons in 1979, 1,930 tons in 1980 and 2,105 tons in 1981.

Akouta: A Deposit 250 Meters Down

Ten km southwest of Arlit, in a monotonous countryside of sandstone outcroppings and sandy stretches, stands Akouta. The site of this second uranium deposit worked on COMINAK is topographically indistinguishable from the surrounding barren area. The Akouta workings are not open-pit.

In fact, the deposit is 250 meters deep (260 meters in certain portions of the mines), in moderately carboniferous sedimentary formations. The uranium is located in sandstone formations 1 to 15 meters thick, with concentrations between 2 and 6 kgs of uranium per ton of ore. In addition, the ore contains molybdenum.

To reach the deposit, one must follow a descent formed by two parallel shafts at a 20-degree slope, dug by Nigerien workmen along 1300 meters between September 1975 and September 1977. To achieve this, they drilled, dynamited, loaded waste, cleared it and braced the gallery roof to support the unpressured sandstone outcroppings.

In this mine, undoubtedly the first entirely underground one in the world, it's not only blast-loosened blocks that fall: it rains constantly along certain sections of the galleries, which now total 45 km. The Akouta mine is thus the only place in Niger where it rains every minute of every day: the rate is 250 cubic/hour. The pumped water is used as industrial water in the installations, particularly in the ore-processing facility.

Ventilation is also a significant problem, because it must be adapted to the climatic conditions created at the bottom of the mine by hot water and also by emission of radon, a radioactive gas found in every uranium deposit. Ventilation is made possible by 40 vertical shafts totalling 2,140 meters in diameter, linking the bottom to the surface. Air circulates with a strong flow (675 cubic/second) in the galleries, which are 6 meters wide, 6 meters high and 24 meters apart.

Radioactivity of the work site is also carefully monitored: external radiation is measured for each employee working in a controlled zone; radon concentration is also measured at each site, as is the concentration of radioactive particles. All this is done to prevent workers from exceeding the standards of irradiation protection.

The processing facility has a nominal capacity, expressed in metal content, of nearly 2,000 tons of uranium per year (it also processes molybdenum--100 tons per year).

A conveyor belt feeds the crusher in which the different fragments of ore are reduced. Mixed with sulfuric acid, then oxidized, the product remains in maturation vats. After settling, the uranium-bearing liquid is treated with solvents. As a final touch, the uranium is precipitated out by magnesium to form magnesium uranate. After drying, the product is put into 220-liter metal vats.

Production of the first concentrate of magnesium uranate was achieved on 31 August 1978. The uranium produced in this form has been steadily increasing, from 351 tons in 1978 to 1,839 tons in 1979, 2,200 tons in 1980 and 2,260 tons in 1981. In 1982, if the 2,300 tons predicted are obtained, the production will bring COMINAK's sales figures to 55.2 billion, more than the treasury outlays made between 1974 and 31 August 1978 for the complete construction of the installations, expenses totalling 54 billion CFA francs (in today's francs).

9939

CSO: 5100/5684

NEW MEDICAL DIRECTION IN UTILIZATION OF CYCLOTRON FOUND

Pretoria SCIENTIAE in Afrikaans Apr-Jun 82 pp 24-26

[Text] Personnel of the National Accelerator Center (NAC) will be making an important contribution in radiation therapy in South Africa when the Transvaal Department of Hospital Services will begin treating certain cancer growth with accelerated neutrons at the Pretoria cyclotron in the campus of the Council for Scientific and Industrial Research (CSIR) starting next year.

The necessary modifications are now being made in the cyclotron with a view of the ultimate production of a high intensity fast neutron-deuteron for this special cancer therapy. Neutrons will be accelerated within the cyclotron and thereafter inside upon a thick beryllium disk and in so doing produce fast neutrons by way of a known nuclear reaction.

The Transvaal Provincial Administration (TPA) has made available an amount of 500,000 rand for the development of the accelerated neutron facility where patients will be receiving cancer therapy. The medical components, personnel and facilities will all be provided by the TPA.

Therapy

The fast neutrons will be applied mostly for the treatment of advanced cancer growths in the head and neck. These cases are often too advanced for surgical treatment and usually have a poor oxygen supply at the malignant growth which in many instances renders unsuccessful the gamma rays applied in conventional therapy. Radiobiological studies have shown that the effect of fast neutrons is less dependent on the presence of oxygen and this explains the radiotherapeutic interest in fast neutron therapy in the past decade.

Patient statistics in South Africa have shown that these types of growths occur mostly among the black population. It is expected that the first patients could be treated even before mid-1983. This treatment will be administered by radiotherapists, radiographists and medical physicians of the Johannesburg and H. F. Verwoerd hospitals.

The program will unfold in two ways. First of all the Pretoria cyclotron must be modified so as to be able to provide an external neutron-deuteron of

50 micro Amperes in the experimental room adjoining the cyclotron room. Secondly it will be necessary to conduct radio-biological experiments which provide satisfactory results before patients can be treated.

Hand in hand with this there is of course the determination of the physical characteristics of the neutron beam as well as the protection of the personnel. The knowledge and experience gained with these projects will serve as a forerunner for the planning and development of similar projects at Faure, near Capetown, when the open sector cyclotron of the NAC, which is under construction there, is put into operation.

Modifications

The modification of the cyclotron in Pretoria will be carried out in two phases. The first thing will be the designing of a passive magnetic channel which will be placed in the cyclotron between the two D-parts on the south side so as to focus the external beam in the horizontal direction partially. Hopefully this modification will increase the neutron beam on the beryllium disc by a factor from 3 to 4 and in so doing provide a more appropriate dosage rate for radiobiologic experiments.

In order to realize an external neutron=deuteron of 50 micro Amperes in the experimental room a second active magnetic channel will be designed and positioned in the withdrawal chamber. The withdrawal room is coupled directly to the cyclotron and is now used only for isotope production. Since the radioisotope production continues to constitute an extremely important and necessary part of the present program these modifications must be made with a minimum interruption of machine time.

Because the neutron=deuteron of 50 micro Amperes or more will be causing an enormous neutron flood upon a beryllium disk it will be necessary to build a neutron collimator for therapy as well as a shielded chamber in the experimental room. The design of the collimator is such that it will allow the passage of a portion of the high energy neutron flood, which arises in the beryllium disc at the terminal of the beam-line, through an opening having variable dimensions while the remaining fast-moving neutrons will be losing almost all of their energy within the neutron braking and absorbing material around the opening, or will be entirely arrested. This part of the project will be carried out in collaboration with the radio therapy personnel of the H. F. Verwoerd Hospital and the Johannesburg General Hospital.

Pilot Project

The first radiobiological experiment with fast neutrons upon cell cultures were already conducted last year at the Pretoria cyclotron. These experiments constitute a part of a pilot project for comparing the effect of gamma rays (origination from Cobalt⁶⁰ source), electrons and fast neutrons on the survival of known cell cultures. Specific cells were selected for this purpose, because extensive radiobiological studies have already been carried out with these types of cells at several prominent foreign institutions.

Since the same nuclear reaction is being employed here as in the Hammersmith Hospital in England and the two cyclotrons are of the same energy, the shape of the survival curve obtained here will be comparable with that of Hammersmith.

By comparing the survival curves as determined with the two machines, it will be possible to determine the relative biological effectiveness (RBE) of the various modalities with respect to each other. This radiobiological experiment inaugurates a new direction for the utilization of the cyclotron which up until now has been used mostly for basic nuclear physics research and the production of isotopes.

Some of the projects forming a part of the development of the fast protons facilities will be undertaken by the Pretoria cyclotron group in collaboration with the universities of Pretoria, Potchefstroom and Witwatersrand.

7964

CSO: 5100/5678

SWEDISH FIRMS OFFICIALLY HAND FINLAND SECOND OLKILUOTO UNIT

Helsinki HUFVUDSTADSBLADET in Swedish 4 Jul 82 p 6

[Text] On Thursday, the Industrial Power Corporation [IK] and Sweden's ASEA-Atom signed the final agreement handing over the second nuclear power plant unit in Olkiluoto.

It was chiefly repeated rotor trouble in TVO-2's generator that delayed acceptance of the plant. According to Magnus von Bonsdorff, the IK's managing director, the company could not accept a plant that was not perfect in all respects.

Under the terms of the original agreement, the plant was to have been completed in 1980.

Construction work on the TVO-2 unit began in 1975, and the plant was ready for fuel loading 4 years later. In 1980, the TVO-2 power plant was hooked up to the national grid for the first time. After that, however, there were repeated breakdowns whenever the ASEA-manufactured generator and its rotor were started up.

Last year the rotors at both TVO-1 and TVO-2 were replaced. This year, operation has continued without any breakdowns to speak of.

Managing director von Bonsdorff emphasizes: "Starting up the TVO-2 unit is part of the largest integrated industrial project in Finland. Building the two nuclear power plant units in Olkiluoto has required top-level international skill and effort."

Lars Halle, managing director of ASEA-Atom, emphasizes that cooperation between the two parties to the agreement has been consistently good, but there is reason to be skeptical about that.

Last year, for example, the Industrial Power Corporation spent 120 million marks to buy two standby generators from Brown Boveri in the FRG.

And the Industrial Power Corporation's claim for damages due to delays in delivery stirred up a commotion in Sweden. The damages amounted to between 150 and 200 million kronor.

According to managing director von Bonsdorff, however, the signing of the agreement means that the economic disputes that may have existed between the two parties have now been resolved. But neither the Industrial Power Corporation's representative nor ASEA-Atom's will say in detail what kind of solution the parties reached.

Von Bonsdorff says: "We reached a compromise solution that satisfies both parties and makes final acceptance of the TVO-2 unit possible." The only questions remaining are those concerned with the plant's operation.

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